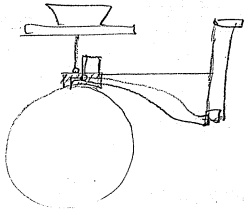
**Notebook, PN-87-00-00.3**

This undated pocket notebook was used by Edison, probably around 1889 or 1890, for notes and drawings on phonograph, chemical, and electromotograph experiments. There is one entry labeled "New Force." The pages are unnumbered. Approximately 40 pages have been used.

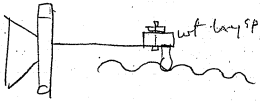
Phosphate Lime. Tri
ppd Chalk.
Sulphate Lime ppd
Hydrate Lime
Resinate "
Oxalate "
Caustic "
Tartrate "
Citrate "
Succinate "
Oleate "
Phosphate Zinc -
Oxalate "
Other Zn ppcts.
Anhy ppd ferric oxide.
Tannate Iron
Cyanide "
Prussian Blue
Chromate Lead
Iodide Copper & Hydrogen
Gelatin film saturated Iodide Silver
Hydrogen

Tellurium per —

Trihydrate alumina
Chloride Silver — Hydrogen
pyrogallic acid. Iodide K. on oxide cylinder
use H to dibrate alkali —
also phenolphthalein —



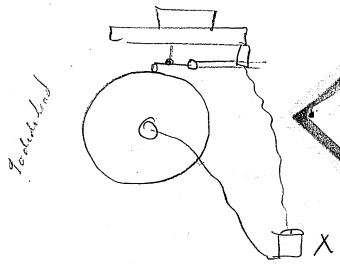
See Amorphous ppt used in
my marked watts —



perhaps with several cells at X + a metal depositing salt say acetate lead to deposit lead or nitrate or chloride silver to deposit silver by def of pressure a powerful alteration coeff can may be had –

Current can be so powerful as to melt a cylinder composed of finely divided say oxalate lime with ppd finely div silver acid pass from the salt saturated to give condensatively

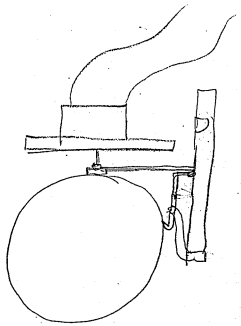
See XX page




Good lead

More or less pressure on ball – let more or less current in by pressure – Chalk or other Cylinder saturated with salt which combines on the side with chk or other material. Work by def friction but perhaps can cause the chemical make. Soluble salt hence washed out or insoluble unpoisons product + hence nothing only where no vibrations in greater or lesser degree a la Lithography or form a pp in pores to hinder porosity

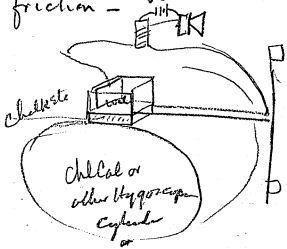
perhaps H+O poles used + accompany
$H_2O$ or glycerine solution of a fatty acid
with alkali free grease stop pore

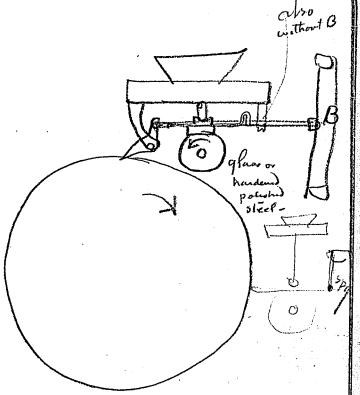


for forcing a point in non-
cutting
if necessity
Compelle-

XX page

a strong Soda Steam Cyl
which is affected by mass
might with acneral cells
give enough heat at point
by Electrolysis to cause
displacement when
point is vibrated by diagm
(B) Keep it hot all time
or if not it might
decompose it freezing
Stearic acid — This would
alter Coeff — wkg by
friction —

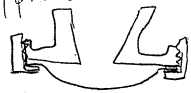



also
without B
B
glass or
hardened
potash
steel
A
Sp

find a pressed cylinder of extremely finely divided powder non scratching + cut record (10) try it in place of wax Can track deep probably - Tri hydrate alumina powdered, etc =

French chalk - Electrotypes pbqo or phalogrfos =

Reg phono



Spun out aluminum or silver so dea as a whole moves at rubber & not as at present moves in center -

Very finely levigated hydrous
clay is practically as fine as wax
when pressed when dried quickly
probably be smooth + just as
easily cut if not easier than
wax - Could varnish record
if want preserve - after drying
would be very hard Could then
be oiled or greased to
lubricate - + great pressure
used so as to make it could
follow record -

It is from the silicates of the alkali metals that iron takes up the largest quantity of silicon — By fusing Crude Potash, Charcoal, Iron filings & Silica a regulus obtained containing 15.16% silicon & 2.94 Carbon

Hence Ogden felspar will give large supply potash & permit founding iron to be made at lower temperature —

If $Fe_2O_3$ (Ferric Ox) be reduced by Hydrogen at 700 C no pyrophoric iron is obtained CO produces the same result as H. forming Magnetic Oxide at 350 C pyroporic Ferrous Oxide at 500 C & metallic iron at 700 to 800 C

Reduction of mixtures of $CO_2$ & Cyanogen This mixture at a high temperature exerts a stronger reducing action than mixtures of $CO$ & $CO_2$ — with one Volume of $CN$ & 6 Vols of $CO_2$ at 685 to 710 Fahr Ferric oxide is deprived of 79.9 % of its O yielding 56.6 metallic iron If the proportion of $CO_2$ be increased to 15 Volumes to 1 of $CN$ 6 % of metallic iron is obtained & when the proportion is 30 Vols of $CO_2$ to 1 Vol of $CN$ only 0.9 % metallic iron obtained

Felspar - Orthoclase.

| | |
|---|---|
| $SiO^2$ | 66 |
| $Al_2O_3$ | 17.5 |
| $CaO_3$ | 1.0 |
| $K_2O$ | 13.0 |

our ore 68% —
Contains 137 lbs gangue
of all felspar
Silica 90 lbs
alumina 24 lbs
lime 1.⅓ lbs
Potash 17 3/4 lbs —
24.7 lbs per ton Fe of $K_2O$

Heat of Combustion

| | | |
|---|---|---|
| CO | 28 | |
| $CO_2$ | 97 | |
| SiO | 219 | |
| CN | 41 | |
| CNH - | 141·1 | Hydrocyanic ac |
| K cy | 45 | |
| K cyanate | 116 | |
| Mn O | 94 | |
| $Mn O_2$ | 116 | |
| Fe O | 68·2 | |
| $Fe_2 O_3$ | 191·2 | |
| Carbon Di Sulph | 12·6 | |

Formula
Magnetic oxide
$Fe_3 O_4$

The most fusible double silicate of two bases such as lime & alumina are those in which the O of both bases amounts to 2/3 rds of the O in the silica & the O in the lime equals that in the alumina – But in practice to prevent the formation of a silicate of Alumina & iron an excess of lime is necessary so that the lime is increased as the O of the bases equals the O in the silica

1 gram of following burnt with O gives following Heat units –

| | | Product |
|---|---|---|
| Hydrogen | 33881 – | $H_2O$ |
| Wood Charcoal | 7900 | $CO_2$ |
| Sulphur | 2220 | $SO_2$ |
| phos yellow | 5747 | $P_2O_5$ |
| Zinc | 1330 | $ZnO$ |
| Iron | 1582 – | $Fe_3O_4$ |
| Tin | 1147 | $SnO_2$ |
| Copper | 603 | $CuO$ |

| | |
|---|---|
| C to $CO_2$ | 2403 |
| Stannous ox to $SnO_2$ | 519 |
| Cuprous ox to $CuO$ | 256 |

Atomic wt

| | | | |
|---|---|---|---|
| C. | 12 | K | 39 |
| N | 14 | Ca | 40 |
| O | 16 | Mn | 55 |
| Al | 27.5 | Fe | 56 |
| Si | 28 | Co+Ni | 59 |
| P | 31 | Cu | 63 |
| S | 32 | | |

Watts D Vol I 780 – Lime either hydrated or anhydrous combines with Carbonic acid in the air in ordinary condition of moisture but not any action between Anhydrous lime & Carbonic anhydride

p 781 – Carbonate lime commences decomp a dull red heat in open air – in a current of air or any other gas or frequency of action decomposition takes place at a lower temperature =

Coalash
American Anthracite
Si: 54.50
Al 34.45
Sesquo. 7,50
Lime 2,25
Magnesia 1,30

Bell say

At low red heat point of equilibrium of action of $CO_2$ on reduced metallic Iron is when

150 vols $CO_2$ to 100 CO

full red 47 vols $CO_2$ to 100 CO

nearly white " " " "

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Bell says at Bright-red heat in mixture of equal vols of $CO_2$ & CO an oxide containing 100 Fe & 29 Oxygen may be considered stable, (18) proto ox anhydrous

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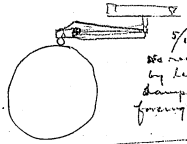
Phons –

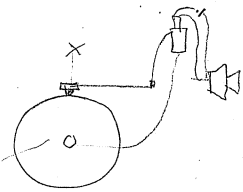
Oxychloride Zinc The O ppd very fine –
" Neoquassin –
Plaster Paris very fine opaque & finely ground
Precipitate lime or other Gases & Bodies &c –
$K_2O$ Lebowalud dreamy Resinate –
Aluminate Soda
Burnt alum fine –
Ferrocyanide.
Magnesia by distill
Carb lime by ppton in very dilute sol by $CO_2$



5/1000 ball & flow wax
Not necessarily but repulsion by leverage – thus this dampened by pressure of forcing ball against wax.

May be expansion interferes too then it could be put on an alc. wax cylinder –

or on a polished metallic shell
a film of a very hard wax dissolved in a very volatile solvent & dropped the rapid drying of solvent leaves film porous smooth hence easily compressed perhaps more smooth than cutting




platinoid metal cylinder say ~~[illegible]~~ Magnesium Aluminum X leather give off O at contact with cylinder or Silver cylinder Iodide K give I on silver or Chlorine work by friction — or Sulphur or Sulphuretted H on Silver —

also work X direct by deaphm without telephone ~~a reproducer~~ with Continuous Current dia varying pressure hence contact or reproduce by Energ friction —

10th Cenous

Pardee Shaft anylysis —

S 0·113

P 1·067

Fe 59·23

| | | | |
|---|---|---|---|
| Proto | 25 34 | Insoluble | |
| Perox | 56 37 | Si | 7.63 |
| Alumina | 3·08 | Alumn | 1·99 |
| Lime | 4·09 | Lime | 0·04 |
| Mag | 0 27 | Mag | 0·02. |
| Di Sulph Fe | 0·212 | | |
| $CO_2$ | 0·06 | | |
| Phos acid | 2·44 | | |
| Titanic | 0·09 | | |
| Combined $H_2O$ | 0·38 | | |

Probably gelatine glycerine fulmis or gelatin glycerine with the chemical medium will be better for continuous current resolutions with diagram for varying continuous record

fits – pure amorphous carbon free of each action of Sodium on CO.
no O N or H left in it no ash –

In Expts on absorption $CO_2$ use Broken Carbon fil Lamp + induction Coil with fixed spectroscope + tube tubes in pump

Central wire in Lamp – Magnesium or Aluminum + spark Coil to fix the $CO_2$ + Co oxygen lines of

also central wire with piece of hard Sodium amalgam Connect to Pump & the heat gradually Cause Co to be absorbed.

Think a Brunette K or the alloy can be made so dispense with Hg

Chunk of Connellsville Coal cured to powdered to the highest impalpable powder that some boiling hydrocarbon of paraffine Olefine or other series cured to make to extract that Coking Tar coloured at how

Pure dry Hydrocyanic acid gas output to deposit Graphite / Heating fused dry cyanide of K in Vac with phos anhy to absorb Water should give it off slowly in Vac to flash or if not enough flash thick wired ~~to~~ slowly give it off

Peroxide Lead absorbs Dry Co make a Carbonate Pb -

fits Impressions from Pitch. (1) fixed Carbon both Blast furnace pitch + Coal tar pitch + Stearine pitch -

Photograph = Dry Strontia Hydrate, Caustic Strontia, Carbonate Strontia Carbonate Lithia, Baryta Caib, Hydrate + Caustic

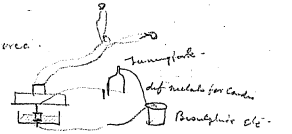
Phono:

Pb cylinder polished + slightly oxidized by Current, then telephone + heather point to reduce surface to Lead - or polished surface ~~or~~ Lightly on telephone + oxidize surface - diffective

also tin cylinders same process Zinc Copper + O also chrome - Prussian. from O + prussian blue stc -

Why not pick pure Connellsville Coal + grind it to the highest impalpable by blowing etc after that regrind + then use minimum Carmel or Aniline Nitric + Carbonyl that to be chemy

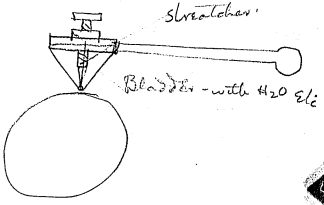
New force.




Phono

Say tin cylinder coated with Gelatinous thin film of Gelatine, or other conductor & when moist, make O on tin + H on ball on dissolving Gelatine the record is in oxidized surface work by friction, ~~[illegible]~~ or probably in place gelatine a soda alcoric film Cured by heat on hot + then moistened or Glycerite Na dissolved in Volatile Solvent or dropped, + moistened after dry

How would Spectrum Method do




My finest polished Lithographing Stone - dead polish - for Eng + phono -

Osmium Iridium points, Iridosmine

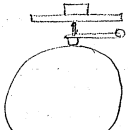
Magnetite point for O.

Aluminum point H side

Soda combines with $Al_2O_3$ form Aluminate Na Lubrication - reverse current makes $Al_2O_3$

On account of power being squares vel & on acct inertia - also elastically storing up power it seems to me glass disk wrong that should be membrane & lightest recording levers points & the stretch got by a very light steel spring or link adjustable for tightness. Disk clamped light at edges by metal not rubber & stretched ~~[illegible]~~ just as the light & the stretch is put on by spring short light but powerful -

polished rubber.



More or less friction by waves electrifies these surfaces locally - then reproduction by disk & disk about two ~~[illegible]~~ square perhaps can get a film like collodion or gum collan to hold electrofreakum sensual dusts or might attract fine powders & then heating fix the record to be reproduced by ewq friction action

Iodide K gives I at pos K at neg
(1-) K decomp $H_2O$ & H given off $K_2O$ being formed
Sulphate Soda gives Na at neg & $SO_4$ at P. of course Na decomp $H_2O$ & free H given off
Sul Cop - Metallic Cu at neg & Sul acid at pos.
Fused Iodide lead gives I & metal Pb

Stannic chl is liquid & non Condr
Chl arsenic & hydrated chl arsenic ditto -

Acetate or nit Pb & metallic lead on neg & per ox on p.

Ease of decomp
1 1st Iodide K
2nd fused chl Silver
3rd " protochloride tin
4 " Iodide lead
5 Water containing NCl
6 " " $H_2SO_4$

all above with platinum Electrodes with Electrodes by which CP can combine ~~water~~ Sparkless Current
Solutions are more at decomp when both metals are the same as the base of the salt sought to be decomp

Basca insol in water Emly.
Cuprous acetate,
Mercurous "
Albumen, (Insoluble modifiers)
Insol in $H_2O$ Alcohol Sol in Tartric
acetic + phosphoric a —
Antimonates nearly all Insol in water
Arsenicates " " except Kali
Borates except alkalies nearly all insol $H_2O$
Bromate of Mercurous. Insol $H_2O$
B " Silver "
delta Bromide - Hg ous + Ag
Carbonate Bismuth Insol $H_2O$
" Cadmium "
Copper
Lead slightly Sol $H_2O$
Calcium " with Carbonic a
Magnesium "
Manganese Insol
Chloride Cuprous "
" Mercurous "
Silver "

Chromates of Al, Sb Ba Bi Cr Aq
Pb Hg Insoluble $H_2O$
Cinchonidine Insol
Cyanides of alkalis & alk Earths & Hg
Soluble all others insoluble.
Metallic Elaidates Except alkalies
Insol Later dec by excess water
All Ferrates Except alkalies Insol
Ferrocyanides Al Bi Co Cu Fe Pb Mn
Ni Aq Sn Zn Insol waters
Fluoride Aluminum Insol
" Cuprous "
Ferrous "
Magnesium " $H_2O$ nearly so in acid
Hg ous Insol $H_2O$
Fluosilicates Al K Hg Ba Ca Insol
Gallates Insol Except alkalies
Gluten nearly Insol $H_2O$
Indigo Insol $H_2O$ & abt everything else
Iodates Except alkalies Insol $H_2O$

Iodide Cuprous. Insol $H_2O$
" Hg ous "
" Hg ic "
" Ag "
Sulphur "
Molybdates Except ammonia salt Insol.
Naphthalene "
Nitroprussides. Cu Ni Co Fe' Aq Zn Insol
Oleates Except alkalies insol $H_2O$
Oxalate Al Insol
" Bismuth "
" Cadmium "
" Cobalt "
" Fe' + Fe" "
" Pb Ca "
" Hg' Hg" "
" Ni "
" Quinine "
" Strontium "
" Zn "

Oxide Al ignited insoluble in acids
" Bismuth Insol
" Cadmium "
" Chromium " Hydrate also
" Cobalt " "
" Copper ic & ous "
" Fe ous Insol.
" Pb not entirely insol
" $Pb_2O_3$ Insol
" perox Pb "
" Magnesium nearly insol Hydrate
" not sol in Potash
" Manganese Insol $H_2O$
" Hg ous & ic "
" Ni Insol - Hydrate also
" Tin ous & ic Insol $H_2O$ Hydrate soluble
" alkalies except ammonia
" Zinc Insol
Oxychlorides are generally Insol
Paratartrates Ba Cd Pb Ca Ag
Sr Zn Insol
Periodates mostly Insol

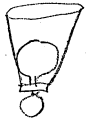
Metaphosphates of alk earths & oxides precipitate
Pyrophosphate "
phosphates Al Insol
" Sb "
" Cad "
" Calc Tri "
Chromium "
Co Cu Fe Pb Hg ous, ic, Ni
Ag Tri Strontium Tin Zn Insol

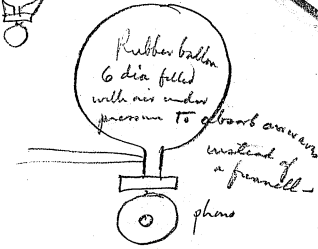
Silicates all insol except alkalies
Sulphate Barium Insol
" Cuprous "
Pb "
Strontium "
Sulphide Sb Bi Cd Ca Chrom
Co Cu' Cu" Fe Pb
Mn Hg' " Ni Ag Tin ous & ic
Zn Insol
Sulphite Ba Cd very slight
Co Pb Mn Ni Stron Insol

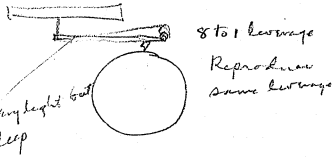
Sulphocyanides Ag Hg' Cu' Bi
Cd Pb Insol.
Tolanic acid equited Insol $H_2O$ acids
of alkalies Hydrate Insol $H_2O$
Tungstates except alkali & Mg Insol
Urates " " Insol

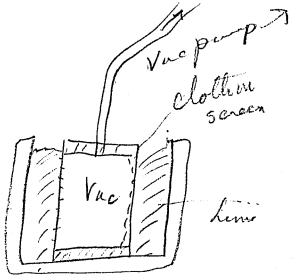
Coating of Insol salts on the electrode
Ag on Ox side in Dil HCl. Coated
Chl Silver in argentocyanide of K
coated with argentic cyanide lead
in Dil Hydrofluoric Coated with
fluoride ~~Aluminum~~ of lead —
Aluminum in many liquids becomes
Coated with insoluble film of oxide &c
which greatly hinders Current,
in Solutions of Nitrate Bismuth, Ag
Manganese — peroxide of the metal
is deposited on the platinum —
also in acetate of Pb Mn in some
Solutions of Ni & Co, and in alkaline
ones of Pb some of films exhibit magnificent
Colours called Metallo-chromy for buttons
On the Hydrogen side dont occur
so often it happens when a sub oxide
of highly oxidizable metal used
such as Salts of Mn & Co

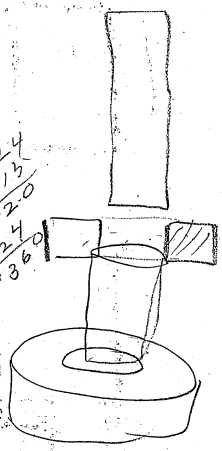
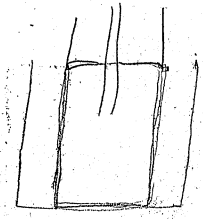
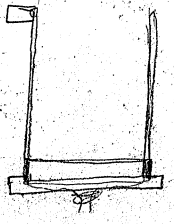
Ox Cu Combines with
Sugar make valuable
Solution – ~~Dep~~ its a
Colloid – try it in
Selenide cells phono –
Prussian blue is Colloid






Vac pump
cloth or screen
Vac
lime

2

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